

FIG. 1

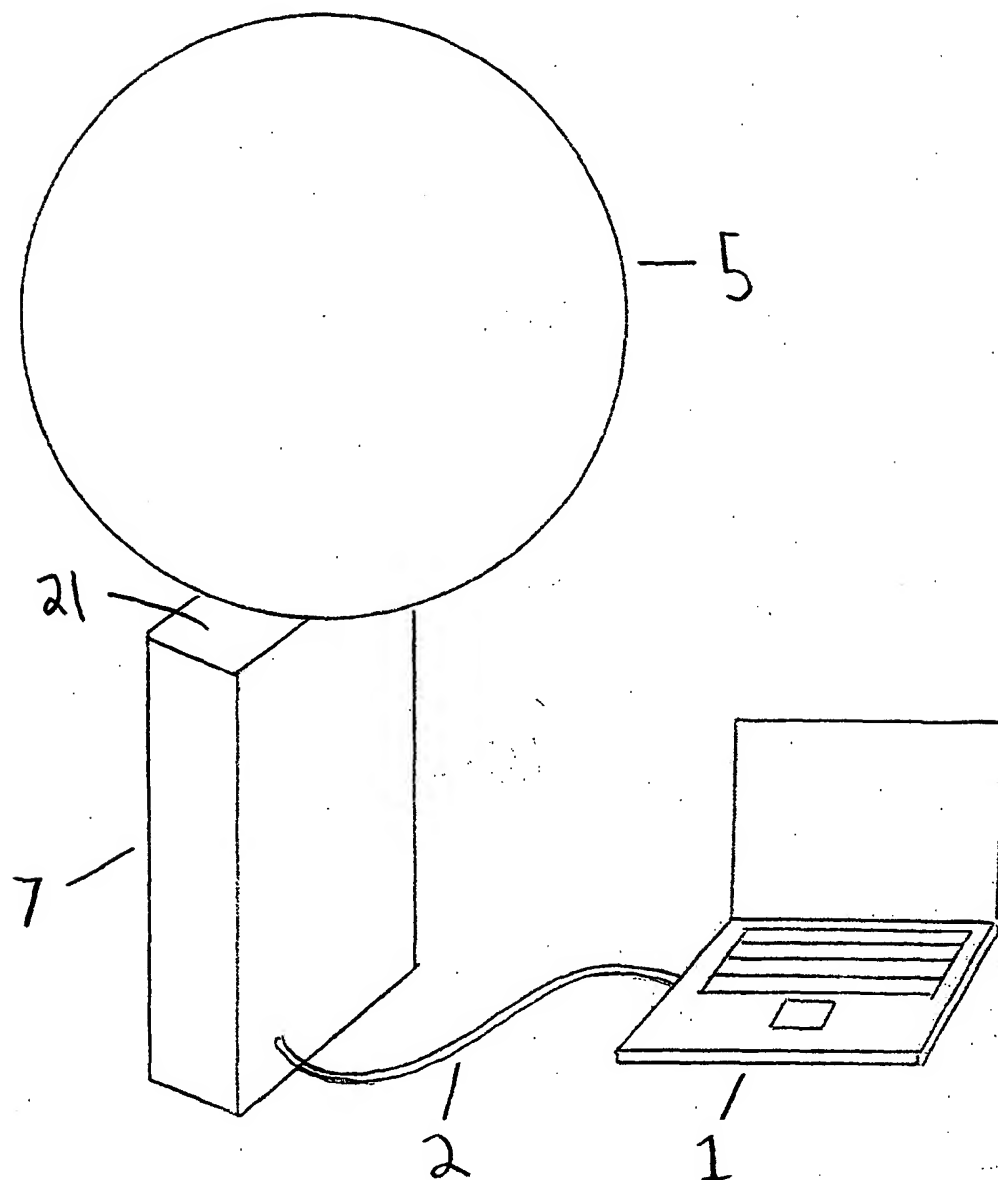


FIG. 2A

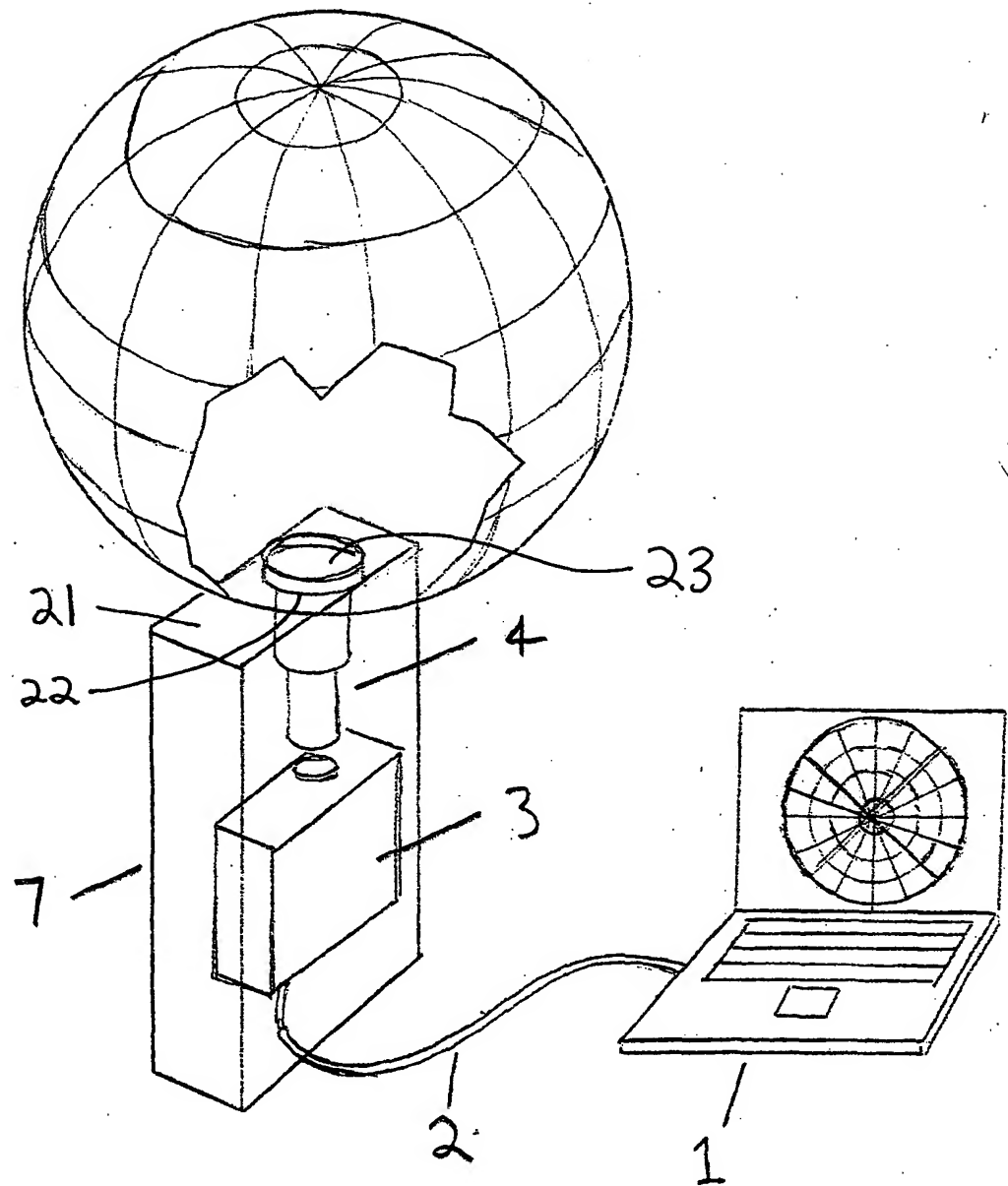
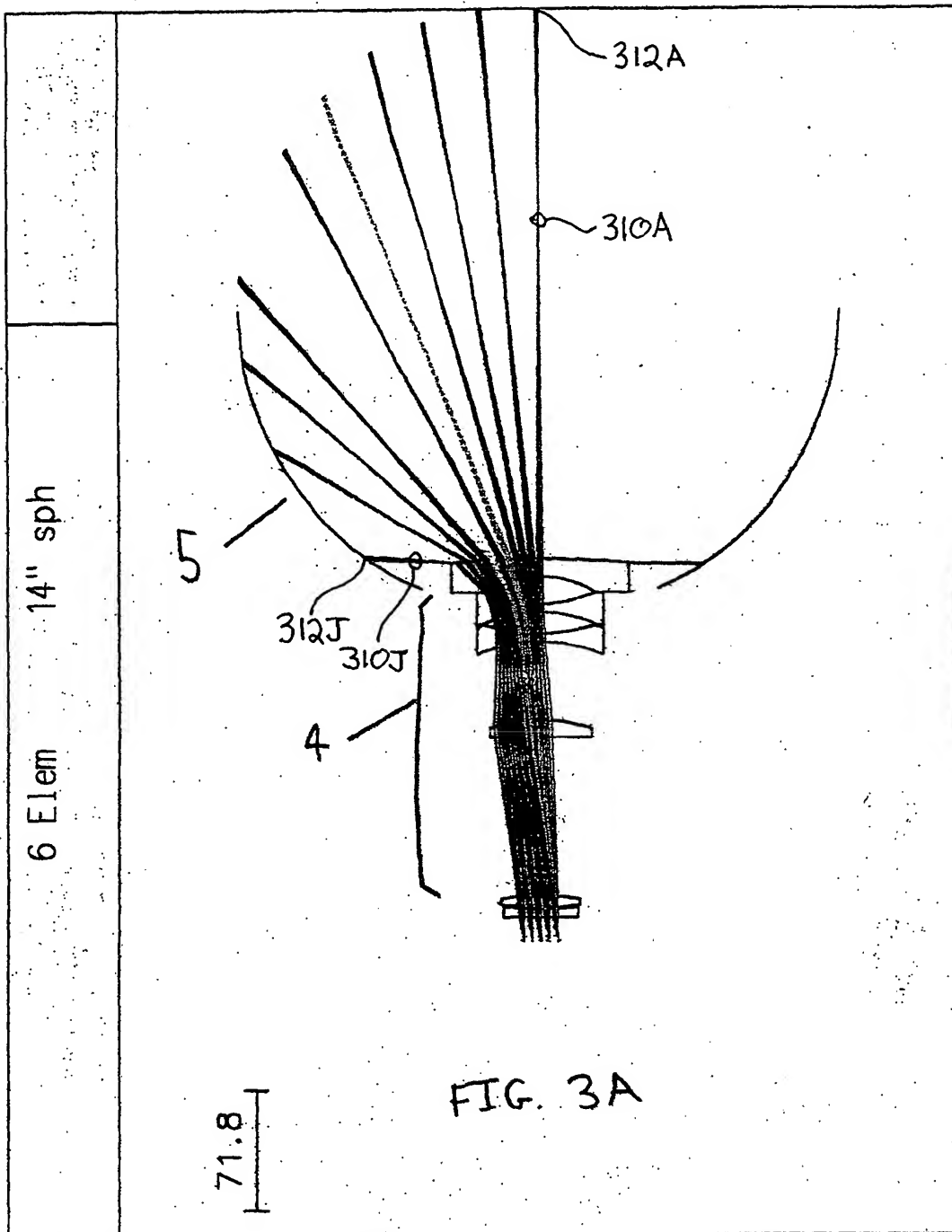


FIG. 2B



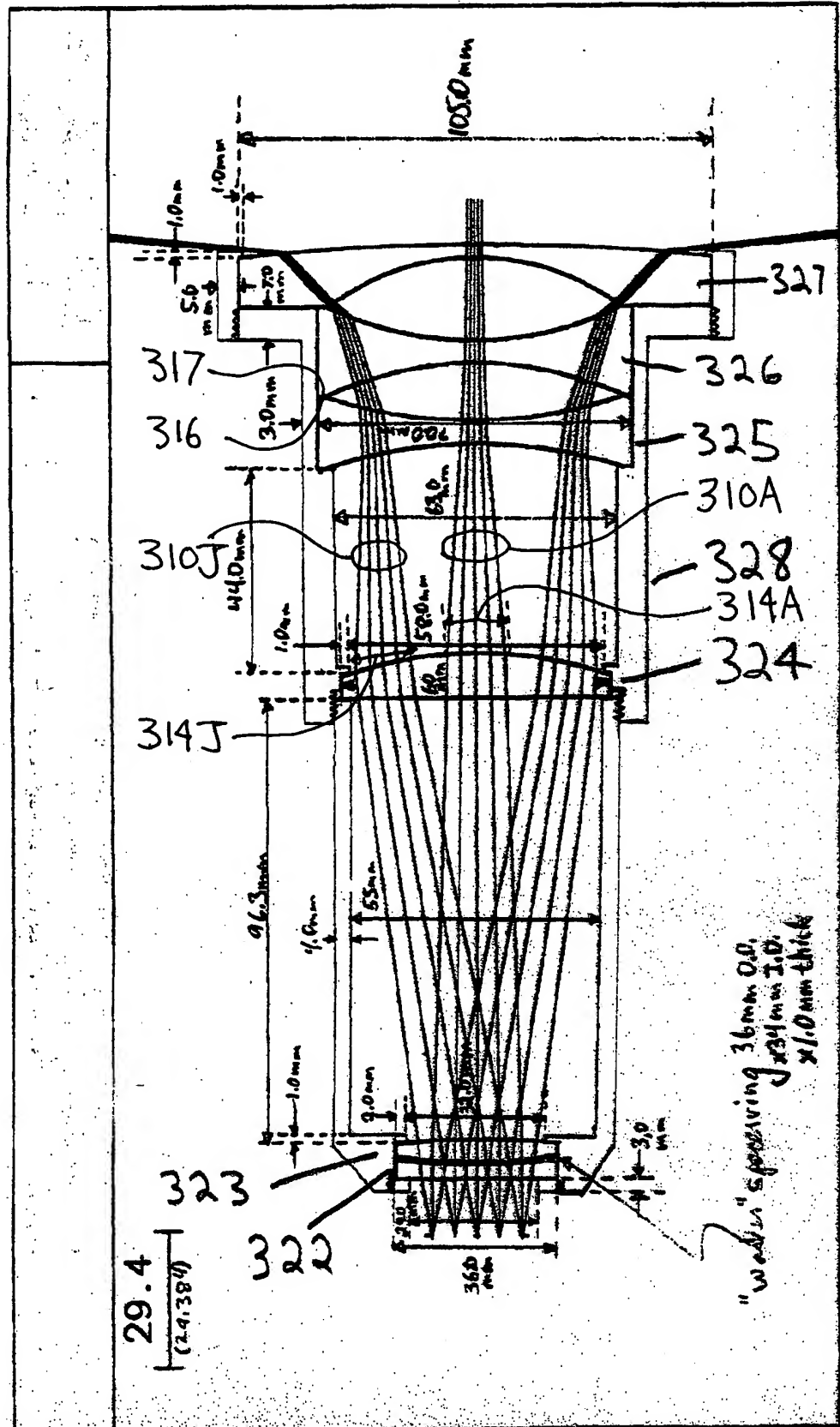


FIG. 3B

Display System Having a Thre -Dimensional Convex
Display Surface; Inventors: STEVEN W. UTT et al.;
Docket No.: 23242-07464

*LENS DATA

SRF	RADIUS	THICKNESS	APERTURE RADIUS	GLASS	SPE	NOTE
OBJ	--	-1.6000e+03	292.000000	AIR		
AST	--	13.000000	10.000000 A	AIR		
2	--	4.500000	22.000000	SF10	C	
JML 67891 PCV SF10						
3	168.260000	0.500000	22.000000 P	AIR		
4	122.680000	7.090000	23.240000	BK7	C	
JML 70552 DCX BK7						
5	-178.870000	94.518476 V	23.240000 P	AIR		
6	--	10.000000	30.000000	CARBO	C	
7	--	45.913584 V	30.000000	AIR		
8	-103.950000	5.000000	37.500000	BK7	C	
Edm Sci 53115 DCV 75mm dia, -100 mm fl, Th 5mm?						
9	103.950000 P	13.000000	33.300000	AIR		
10	-78.000000	5.000000	37.500000	BK7	C	
Edm Sci 53114 DCV 75mm dia, -75mm FL, Th 3 mm						
11	78.000000 P	17.000000	32.800000	AIR		
12	-60.090000	10.320000	32.800000	LLF1	C	
JML 64015 Neg Meniscus LLF1						
13	-697.860000	-32.000000	52.500000	AIR		
IMS	177.800000	--	177.800000 x			

*SURFACE NOTES

2	JML 67891 PCV SF10
4	JML 70552 DCX BK7
8	Edm Sci 53115 DCV 75mm dia, -100 mm fl, Th 5mm?
10	Edm Sci 53114 DCV 75mm dia, -75mm FL, Th 3 mm
12	JML 64015 Neg Meniscus LLF1

*ASPHERIC SURFACE DATA

ASYMPTOTIC SURFACE DATA						
7	ASP	ASR	10	SYMMETRIC GENERAL ASPHERE		
	AS0	--	AS1	-0.005597	AS2	4.4030e-08 AS3
	AS4	--	AS5	--		

*SURFACE TAG DATA

14	ASI	1
	DRW	ON

*REFRACTIVE INDICES

SRF	GLASS	ND1	ND2	ND3	VNBR	TCE
0	AIR	1.000000	1.000000	1.000000	--	--
1	AIR	1.000000	1.000000	1.000000	--	236.000000
2	SF10	1.728250	1.746482	1.720848	28.409716	75.000000
3	AIR	1.000000	1.000000	1.000000	--	236.000000
4	BK7	1.516800	1.522376	1.514322	64.166410	71.000000
5	AIR	1.000000	1.000000	1.000000	--	236.000000
6	CARBO	1.585469	1.599220	1.579900	30.303790	--
7	AIR	1.000000	1.000000	1.000000	--	236.000000
8	BK7	1.516800	1.522376	1.514322	64.166410	71.000000
9	AIR	1.000000	1.000000	1.000000	--	236.000000
10	BK7	1.516800	1.522376	1.514322	64.166410	71.000000
11	AIR	1.000000	1.000000	1.000000	--	236.000000
12	LLF1	1.548140	1.556547	1.544566	45.749335	81.000000
13	AIR	1.000000	1.000000	1.000000	--	236.000000
14	IMAGE SURFACE					

*APERTURES

SRF	TYPE	APERTURE RADIUS
0	SPC	292.000000
1	SPC	10.000000
2	SPC	22.000000
3	PKP	22.000000
4	SPC	23.240000
5	PKP	23.240000
6	SPC	30.000000
7	SPC	30.000000
8	SPC	37.500000
9	SPC	33.300000

Table I

FIG. 3C

10 SPC 37.500000
11 SPC 32.800000
12 SPC 32.800000
13 SPC 52.500000
14 SPC 177.800000

Special Aperture Group 0:

A ATP Ellipse AAC Pass Thru AAN --
AX1 -70.000000 AX2 70.000000 AY1 -70.000000 AY2 70.000000

*WAVELENGTHS

CURRENT	WV1/WV1	WV2/WV2	WV3/WV3
1	0.587560	0.486130	0.656270
	1.000000	1.000000	1.000000

*PARAXIAL SETUP OF LENS:

APERTURE

Entrance beam radius:	0.724036	Image axial ray slope:	0.010000
Object num. aperture:	0.000453	F-number:	-37.131424
Image num. aperture: *	0.030000	Working F-number:	50.000000

FIELD

Field angle:	10.342657	Object height:	* 292.000000
Gaussian image height:	-13.213647	Chief ray hms height:	19.605736

CONJUGATES

Object distance:	-1.6000e+03	Srf 1 to prin. pt. 1:	358.025381
Gaussian image dist.:	-55.481113	Srf 13 to prin. pt. 2:	0.720991
Overall lens length:	225.842060	Total track length:	-1.4062e+03
Paraxial magnification:	-0.045252	Srf 13 to image srf:	-32.000000

OTHER DATA

Entrance pupil radius:	0.724036	Srf 1 to entrance pup.:	--
Exit pupil radius:	0.094539	Srf 13 to exit pupil:	-46.027214
Lagrange invariant:	-0.132136	Petzval radius:	54.277855
Effective focal length:	-53.768941		

SPOT DIAGRAMS

Aperture divisions:	17.030000	Gaussian apod. spec.:	off
X 1/e ² entr. irradi.:	1.000000	Y 1/e ² entr. irradi.:	1.000000

Note: This optical system contains special surface data.
Calculations based on a paraxial raytrace may be invalid.

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FIG. 3C CONTINUED

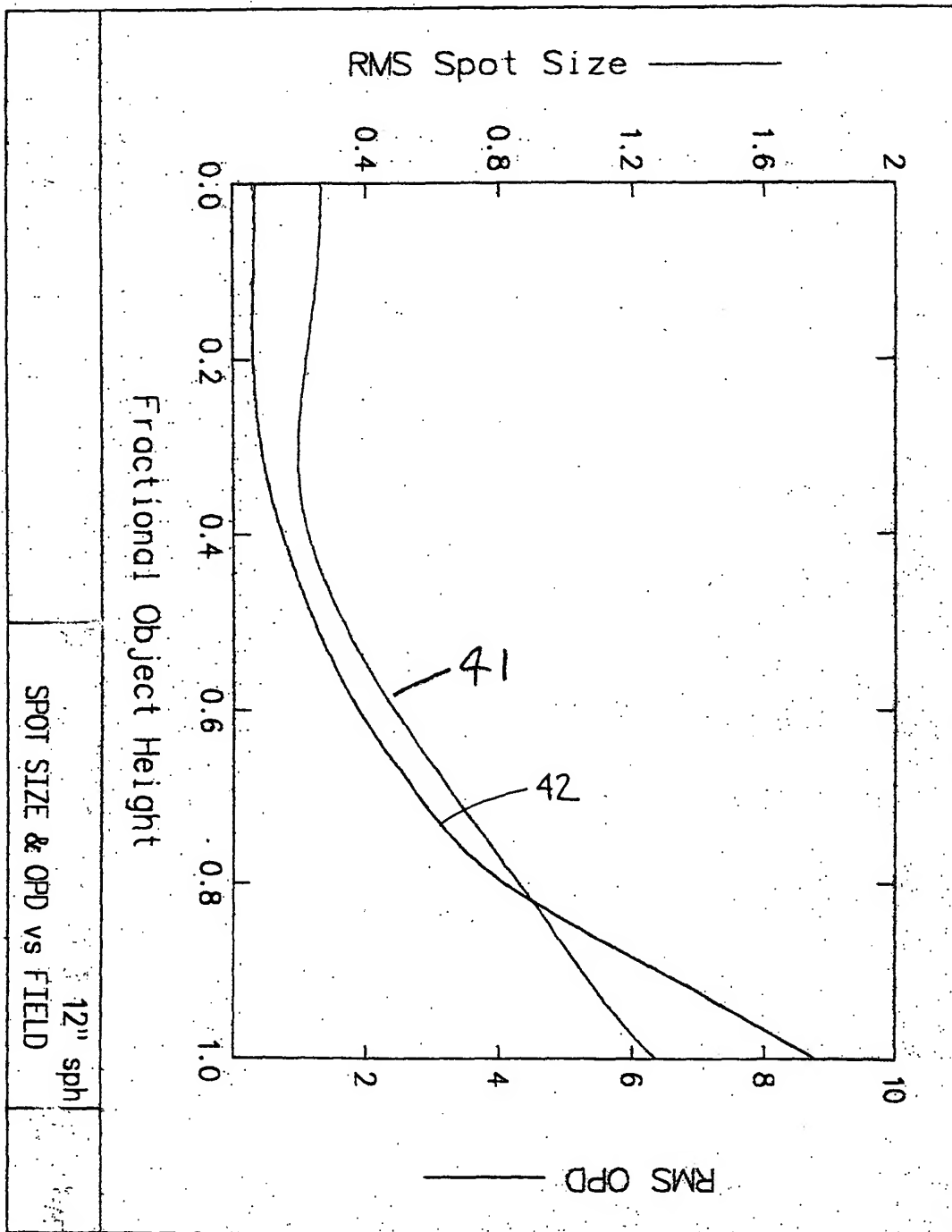


FIG. 4A

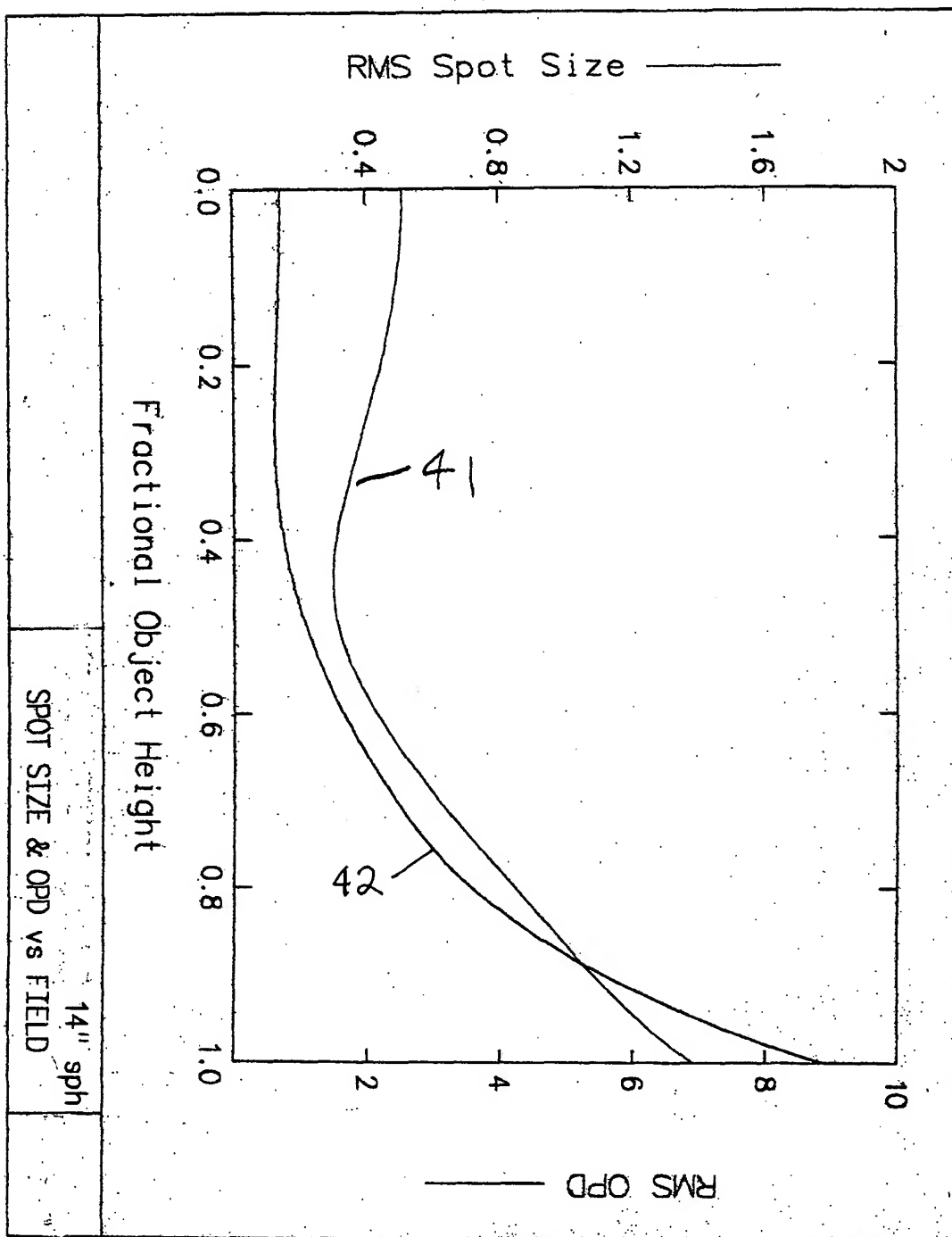


FIG. 4B

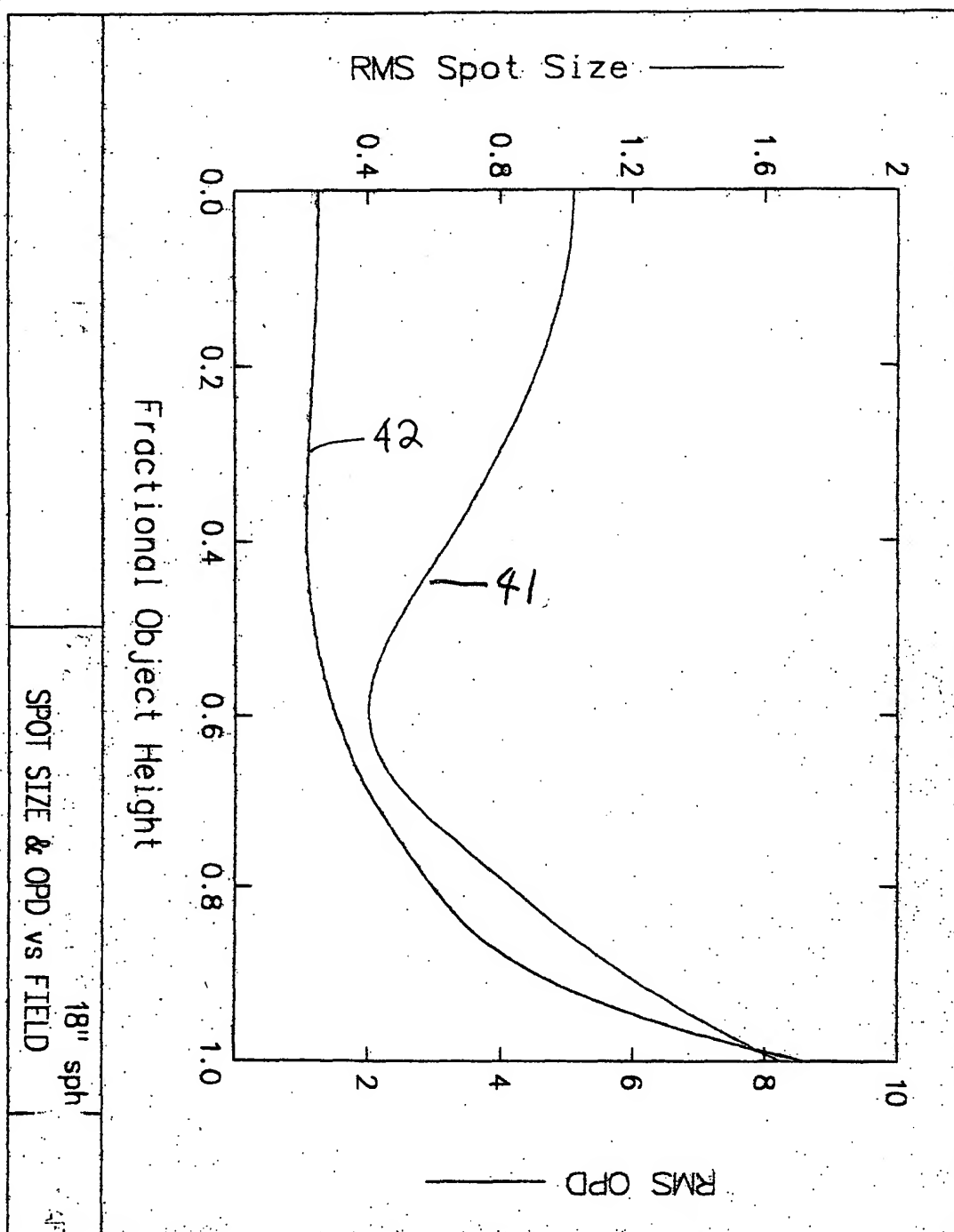


FIG. 4C

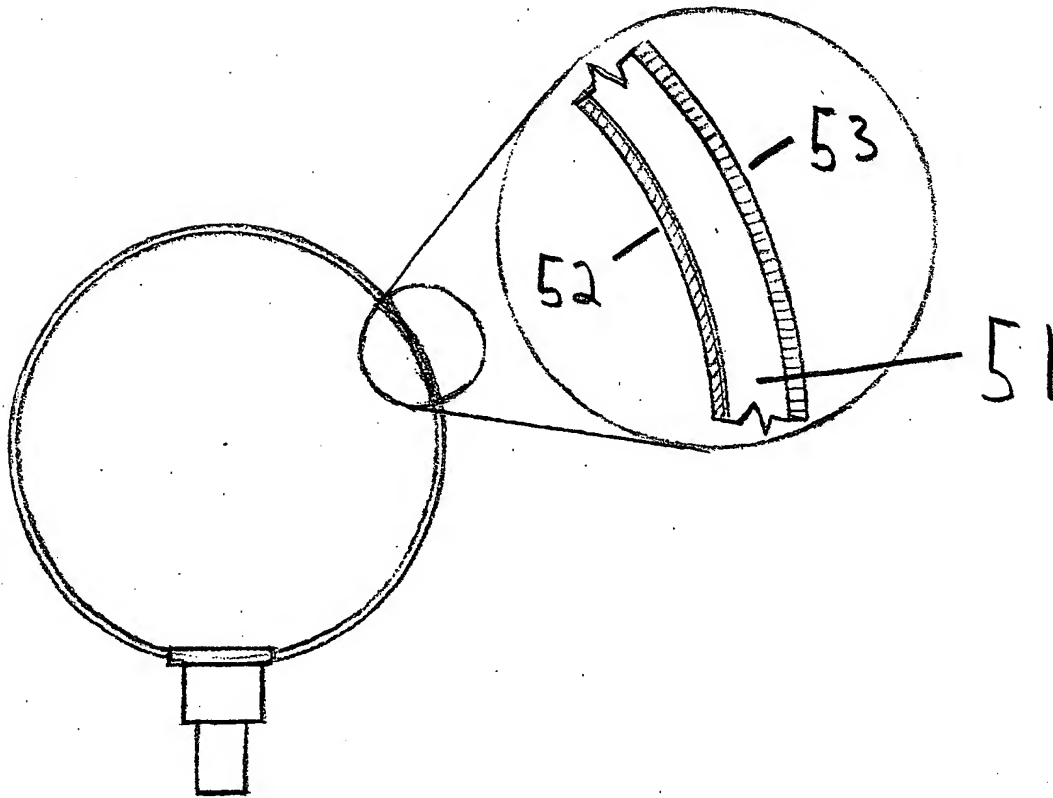


FIG. 5

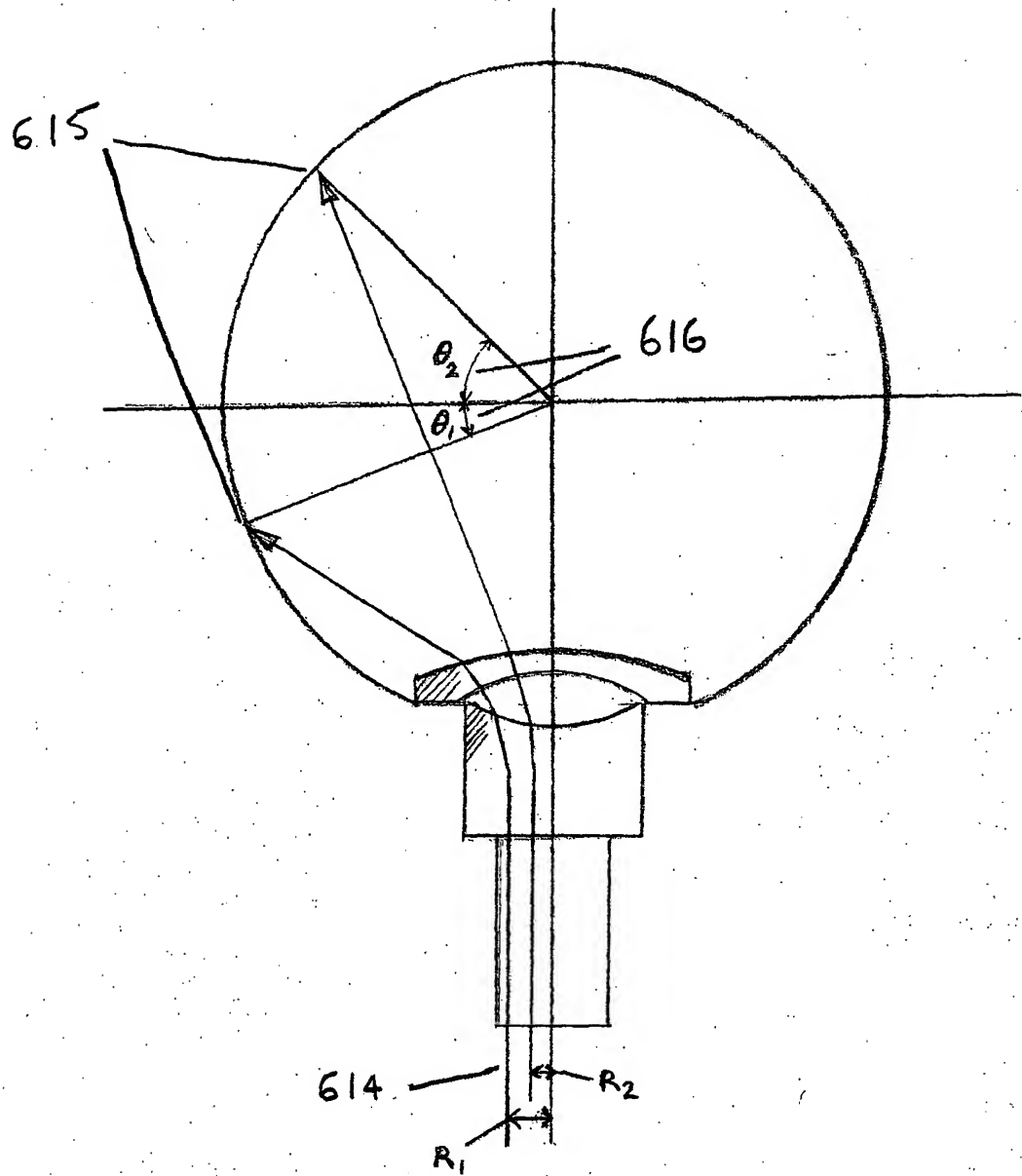


FIG. 6A

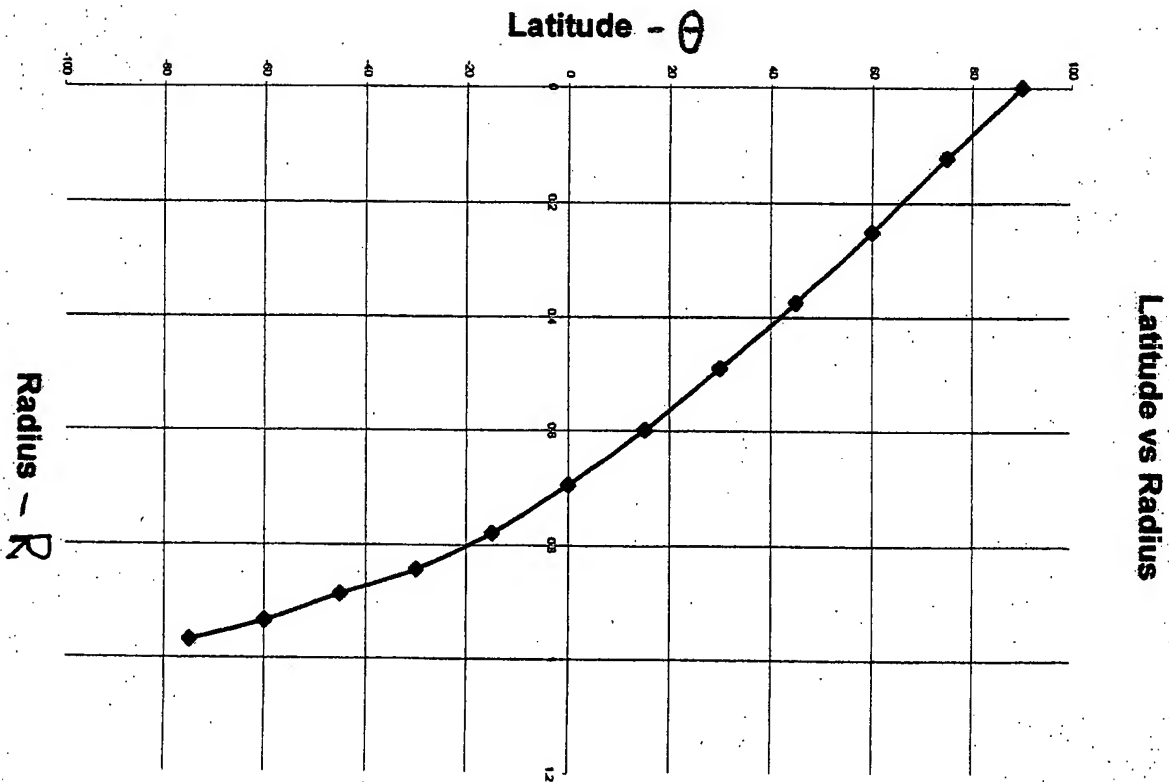


FIG. 6 B

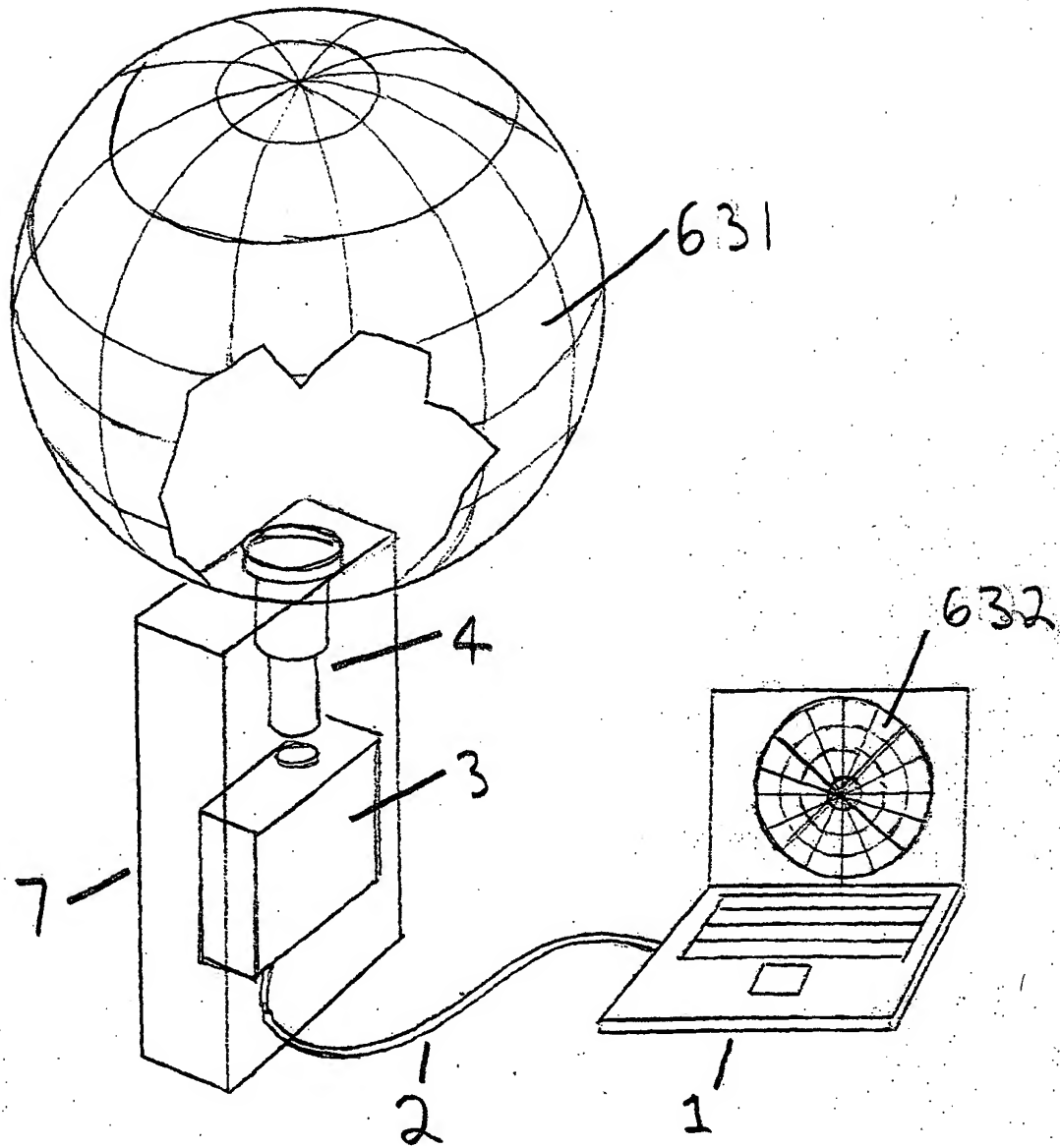


FIG. 6C

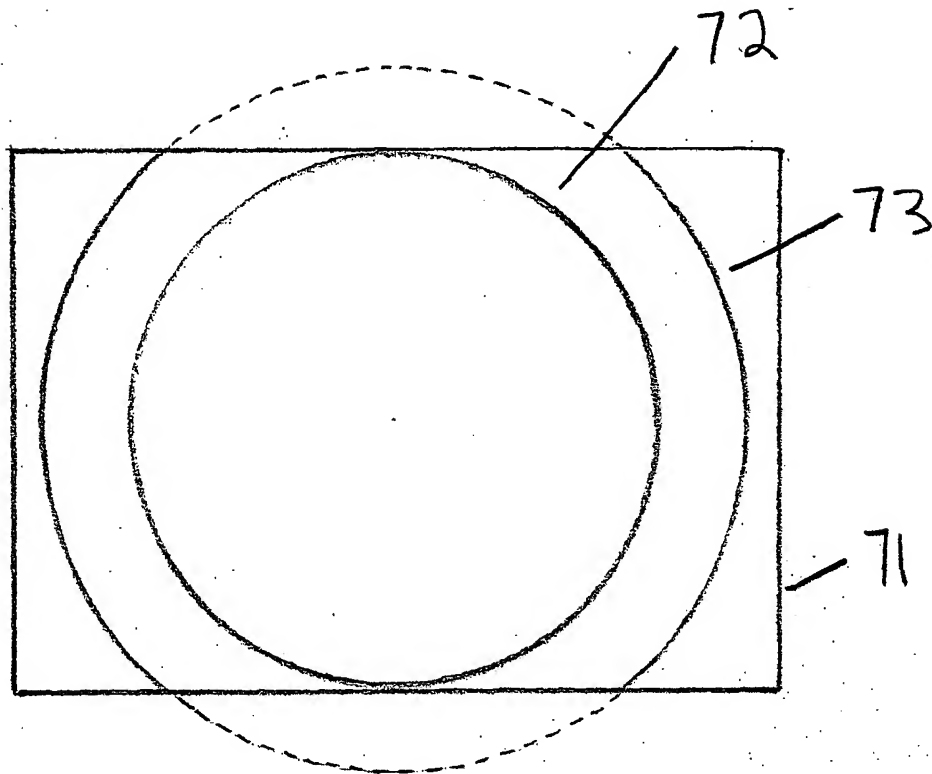
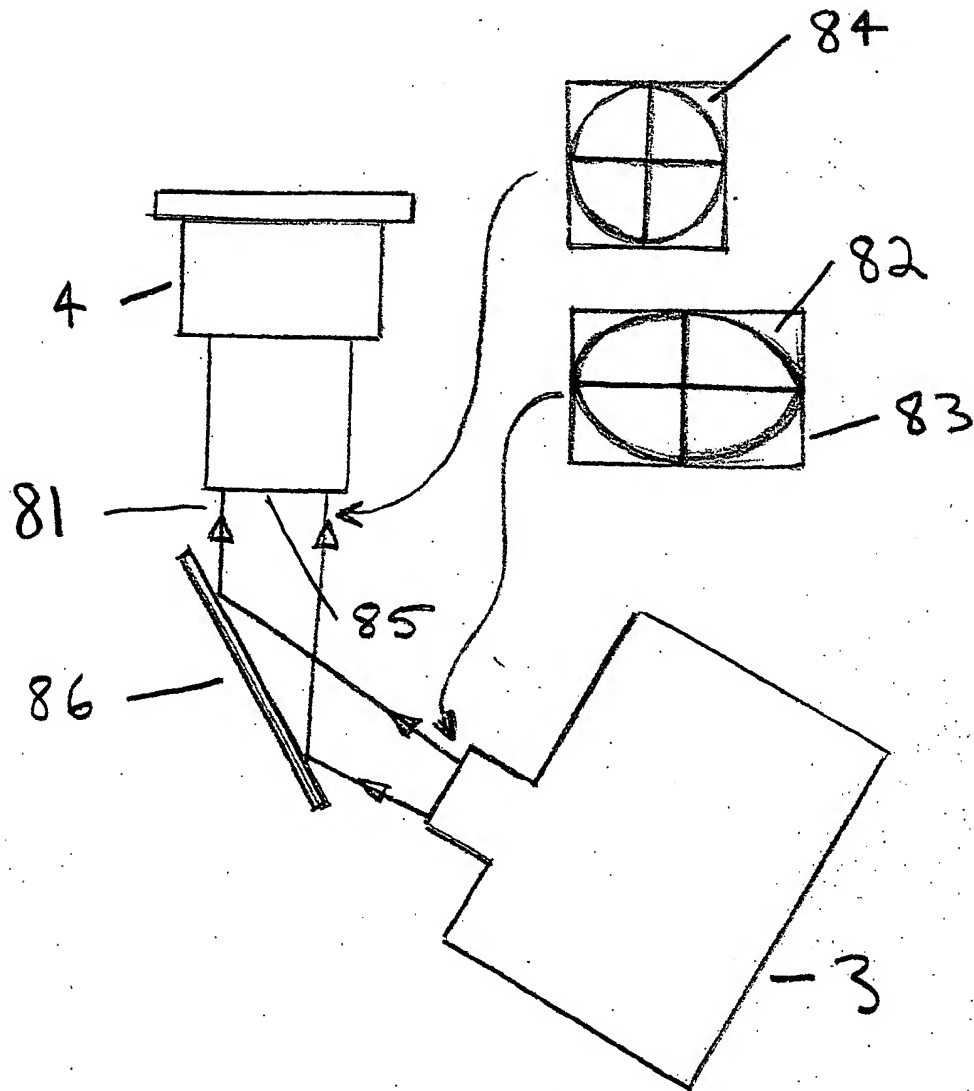
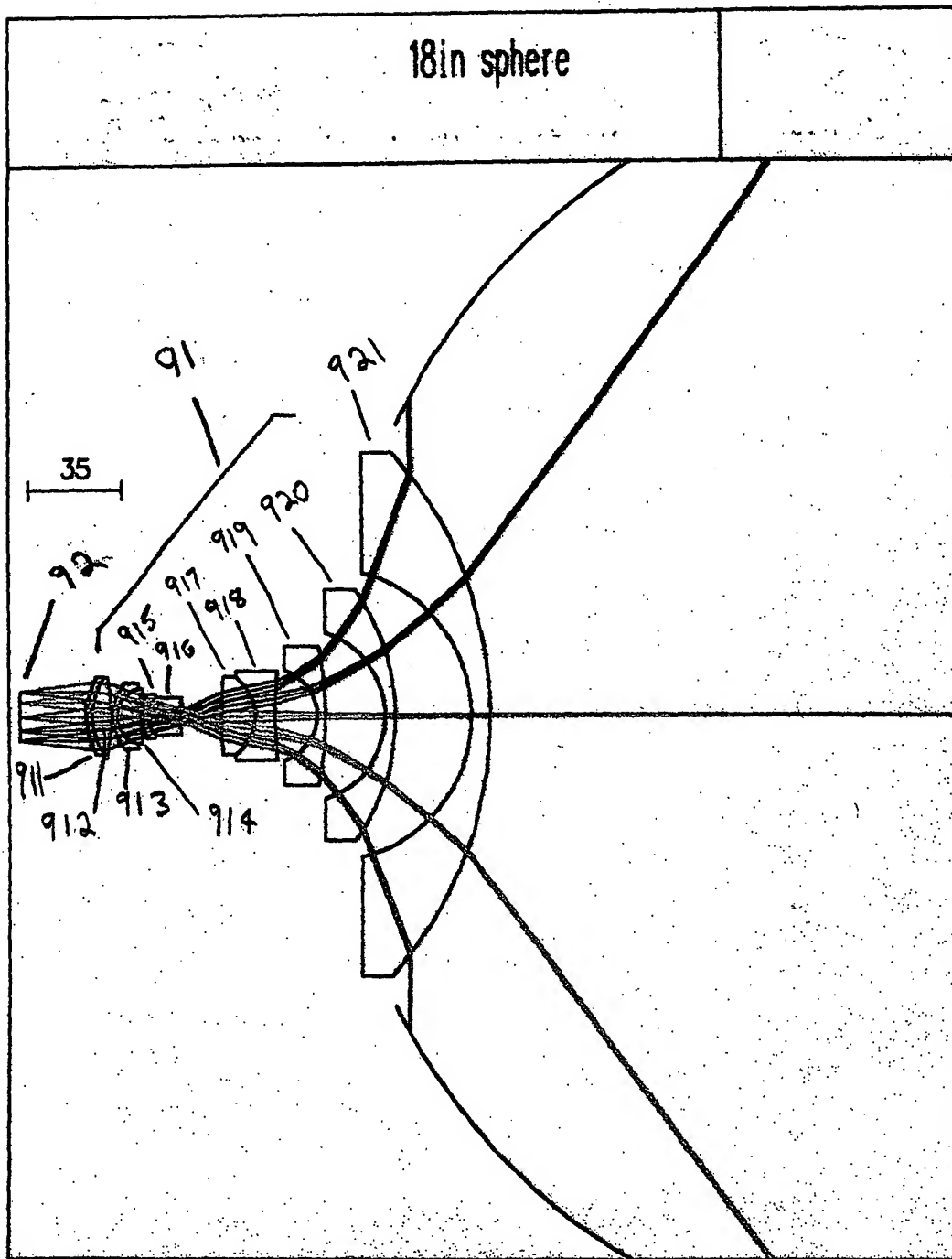


FIG. 7





*LENS DATA						
SURF	CURVATURE	181n sphere THICKNESS	APERTURE RADIUS	GLASS	SPE	NOTE
OBJ	---	24.700000	9.000000	AIR	*	
1	0.032916 V	2.000000	14.000000	SF1	C	
2	0.037270 V	6.999999 V	14.000000	SK11	C	
3	-0.017675 V	0.500000	14.000000	AIR		
4	0.054772 V	1.600000	11.000000	LAFN7	C	
5	0.096657 V	8.762197 V	10.000000	KF3	C	
6	0.007371 V	0.500000	10.000000	AIR		
7	0.042506 V	2.000000	8.000000	SF11	C	
8	0.098204 V	12.000000	8.000000	KF3	C	
9	0.010972 V	1.400000	8.000000	AIR		
AST	---	13.800000	2.875605 AS	AIR		
11	0.005249 V	12.600000	14.000000	SF10	C	
12	-0.058288 V	7.000000	14.000000	SK16	C	
13	0.006234 V	15.500000	16.000000	AIR		
14	-0.058480	3.000000	16.300000	BK7	C	
15	-0.008000	21.800000	25.000000	AIR		
16	-0.031725	3.800000	30.000000	BK7	C	
17	-0.013089	28.000000	45.000000	AIR		
18	-0.019048	7.000000	51.000000	BK7	C	
19	-0.006970	-60.000000	95.000000	AIR		
DMS	0.004374	---	230.000000 X		*	
*REFRACTIVE INDICES						
SURF	GLASS	RM1	RM2	RM3	VNBR	TCE
0	AIR	1.000000	1.000000	1.000000	---	---
1	SF1	1.717360	1.734621	1.710313	29.511275	81.000000
2	SK11	1.563840	1.570284	1.561010	60.795650	65.000000
3	AIR	1.000000	1.000000	1.000000	---	236.000000
4	LAFN7	1.749502	1.764639	1.743193	34.948736	53.000000
5	KF3	1.514540	1.521099	1.511692	54.699656	81.000000
6	AIR	1.000000	1.000000	1.000000	---	236.000000
7	SF11	1.784720	1.806455	1.775987	25.755289	61.000000
8	KF3	1.514540	1.521099	1.511692	54.699656	81.000000
9	AIR	1.000000	1.000000	1.000000	---	236.000000
10	AIR	1.000000	1.000000	1.000000	---	236.000000
11	SF10	1.728250	1.746482	1.720847	28.408719	75.000000
12	SK16	1.620410	1.627557	1.617271	60.320455	63.000000
13	AIR	1.000000	1.000000	1.000000	---	236.000000
14	BK7	1.516800	1.522376	1.514322	64.163927	71.000000
15	AIR	1.000000	1.000000	1.000000	---	236.000000
16	BK7	1.516800	1.522376	1.514322	64.163927	71.000000
17	AIR	1.000000	1.000000	1.000000	---	236.000000
18	BK7	1.516800	1.522376	1.514322	64.163927	71.000000
19	AIR	1.000000	1.000000	1.000000	---	236.000000
20	IMAGE SURFACE					
*APERTURES						
SURF	TYPE	APERTURE RADIUS				
0	SPC	9.000000				
1	SPC	14.000000				
2	SPC	14.000000				
3	SPC	14.000000				
4	SPC	11.000000				
5	SPC	10.000000				
6	SPC	10.000000				
7	SPC	8.000000				
8	SPC	8.000000				
9	SPC	8.000000				
10	CNP	2.875605				
11	SPC	14.000000				
12	SPC	14.000000				
13	SPC	16.000000				
14	SPC	16.300000				
15	SPC	25.000000				
16	SPC	30.000000				
17	SPC	45.000000				
18	SPC	51.000000				

FIG. 9B

Display System Having a Three-Dimensional Convex
Display Surface; Inventors: STEVEN W. UTT et al.;
Docket No.: 23242-07464

19 SPC 95.000000
20 SPC 230.000000

Special Aperture Group 0:
A ATP Ellipse AAC
AX1 -105.000000 AX2

Pass Thru: AAX
105.000000 AY1 -105.000000 AY2 105.000000

*WAVELENGTHS

CURRENT	WV1/WV1	WV2/WV2	WV3/WV3
1	0.587560	0.486130	0.656280
	1.000000	1.000000	1.000000

*PARAXIAL SETUP OF LENS

APERTURE		Image axial ray slope:	
Entrance beam radius: *	3.000000		-0.001528
Object num. aperture:	0.120571	F-number:	2.4346e-19
Image num. aperture:	0.001517	Working F-number:	329.596329
FIELD		Object height: *	
Field angle:	5.1566e-18		-9.000000
Gaussian image height:	715.318127	Chief ray img height:	-13.092823
CONJUGATES		srf 1 to prin. pt. 1:	
Object distance:	24.700000		-18.711634
Gaussian image dist.:	418.643524	srf 19 to prin. pt. 2:	-57.310580
Overall lens length:	148.262197	Total track length:	112.962197
Paraxial magnification:	-79.479792	srf 19 to image srf:	-60.000000
OTHER DATA		srf 1 to entrance pup.:	
Entrance pupil radius:	1.2146e+19		1.0000e+20
Exit pupil radius:	0.718294	srf 19 to exit pupil:	-51.396622
Lagrange invariant:	-1.093117	Petzval radius:	-100.672057
Effective focal length:	5.913958		

*SPOT DIAGRAMS

Aperture divisions:		Gaussian apod. spec.:	
	32.000000		off
X 1/eA2 entr. irradi.:	1.000000	Y 1/eA2 entr. irradi.:	1.000000

Note: This optical system contains special surface data.
Calculations based on a paraxial raytrace may be invalid.

FIG 7B CONTINUED

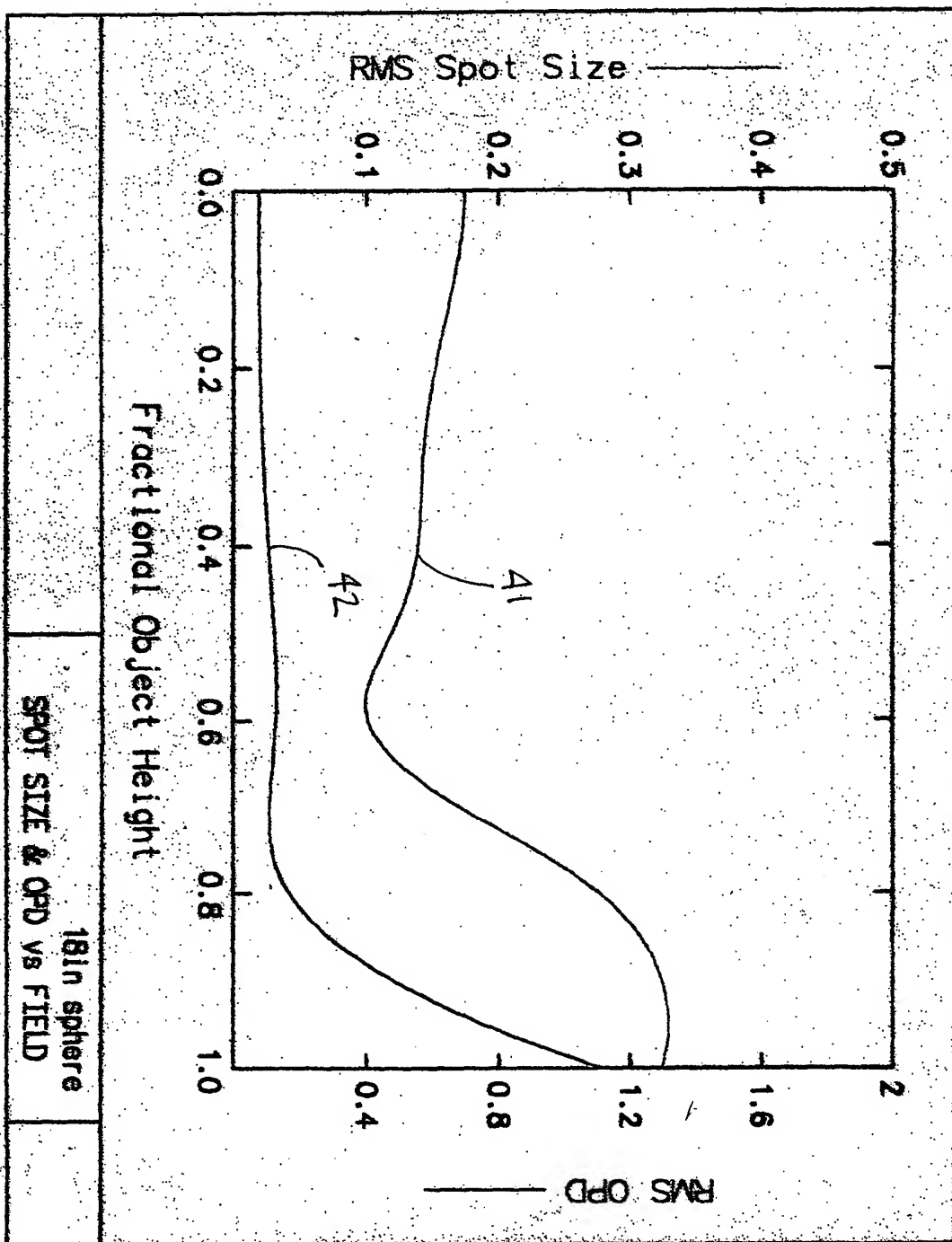


FIG. 9C

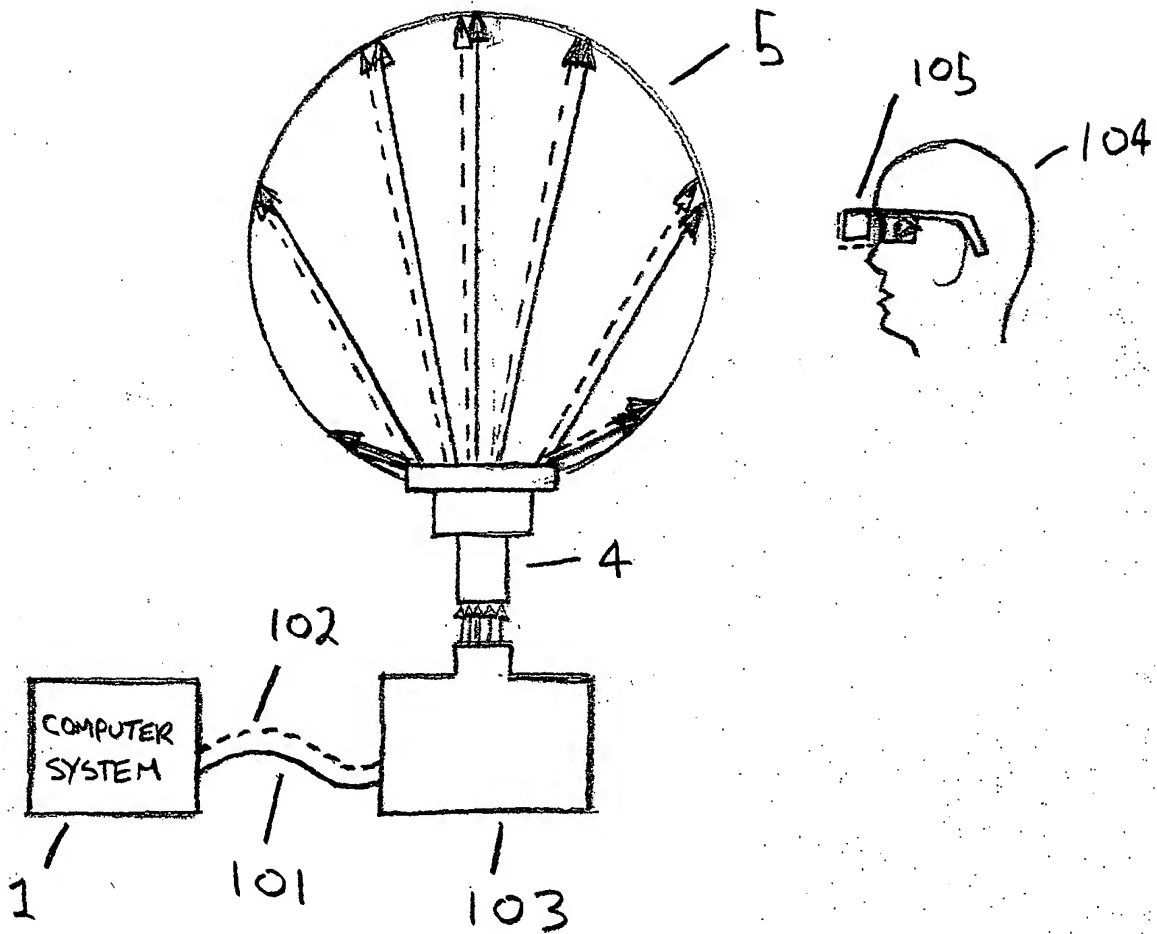


FIG. 10

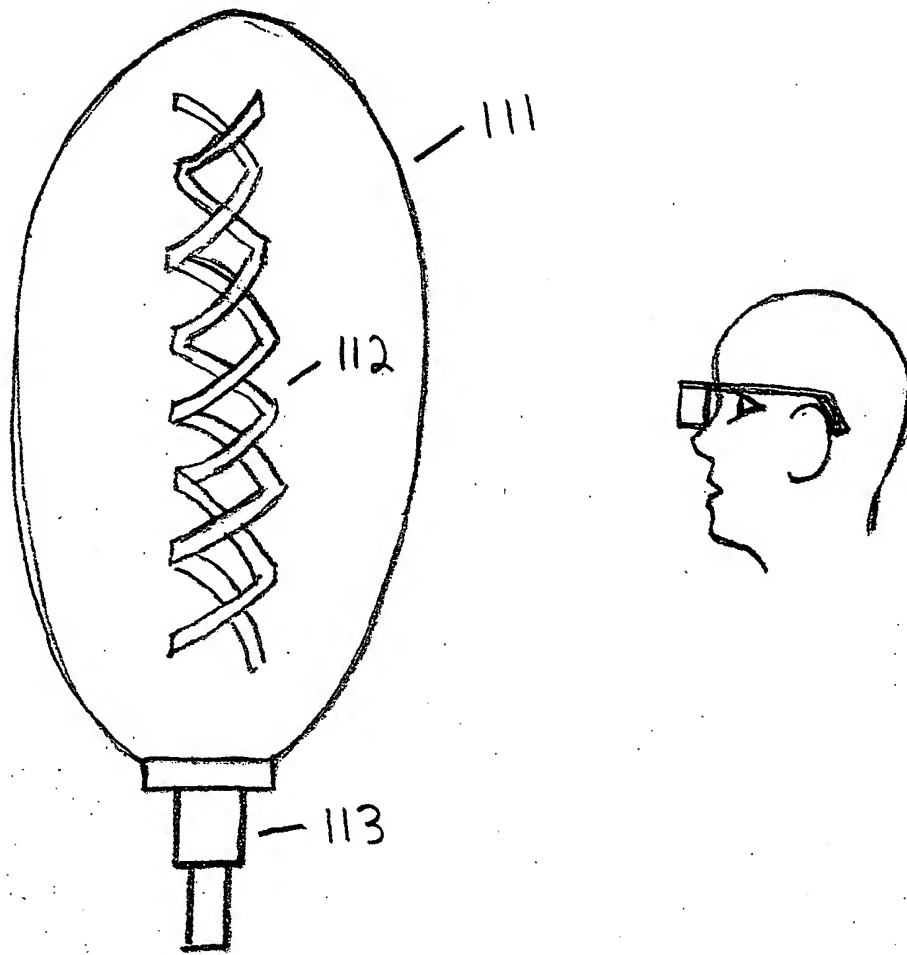


FIG. 11A

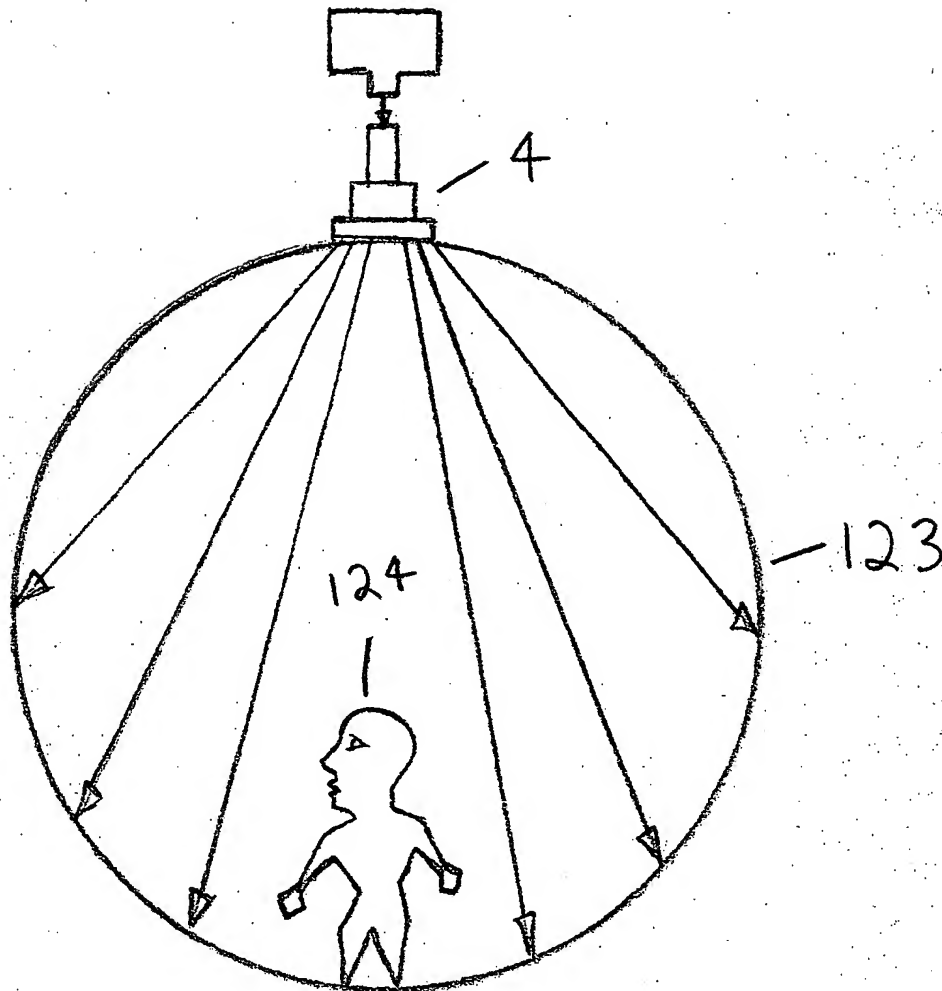


FIG. 11 B

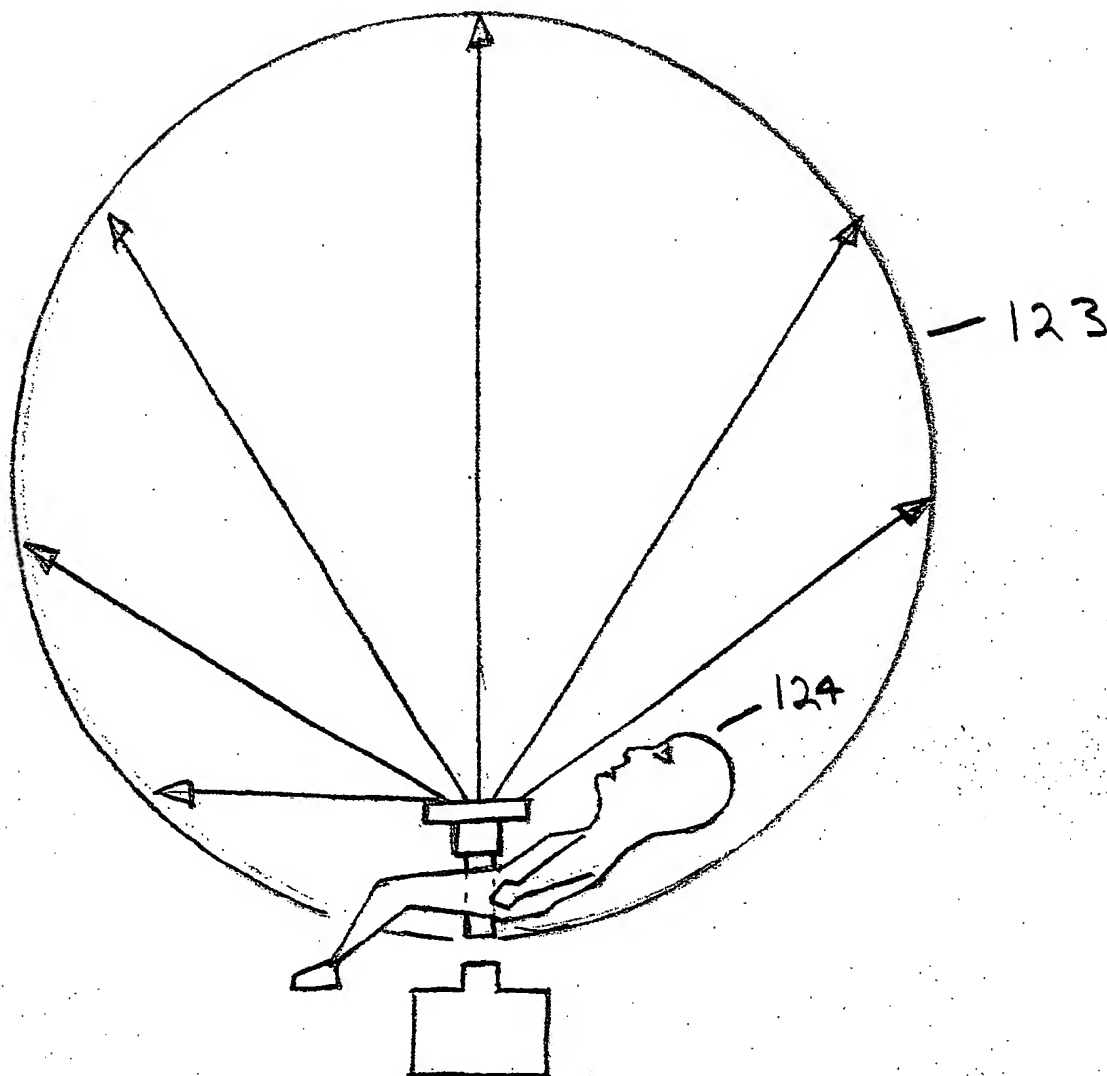


FIG. IIC

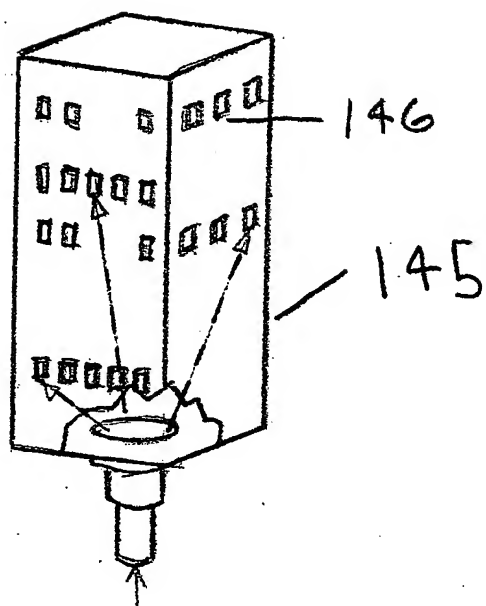


FIG. 11D

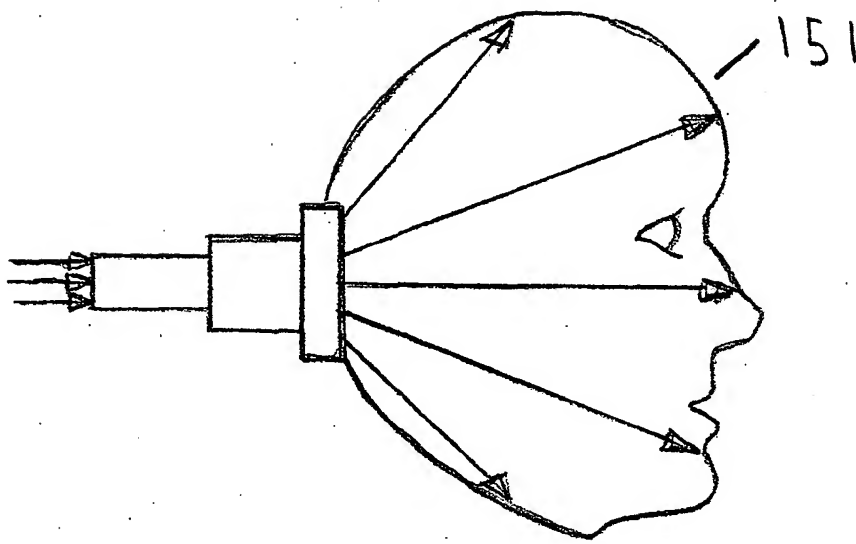


FIG. 11E

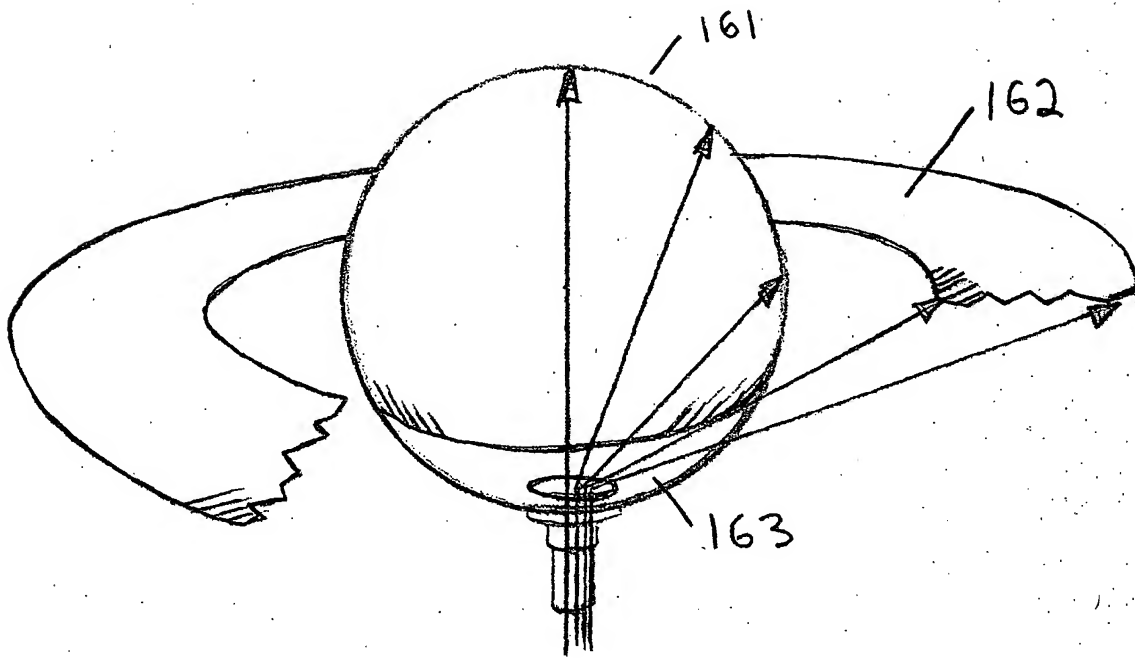


FIG. 11F

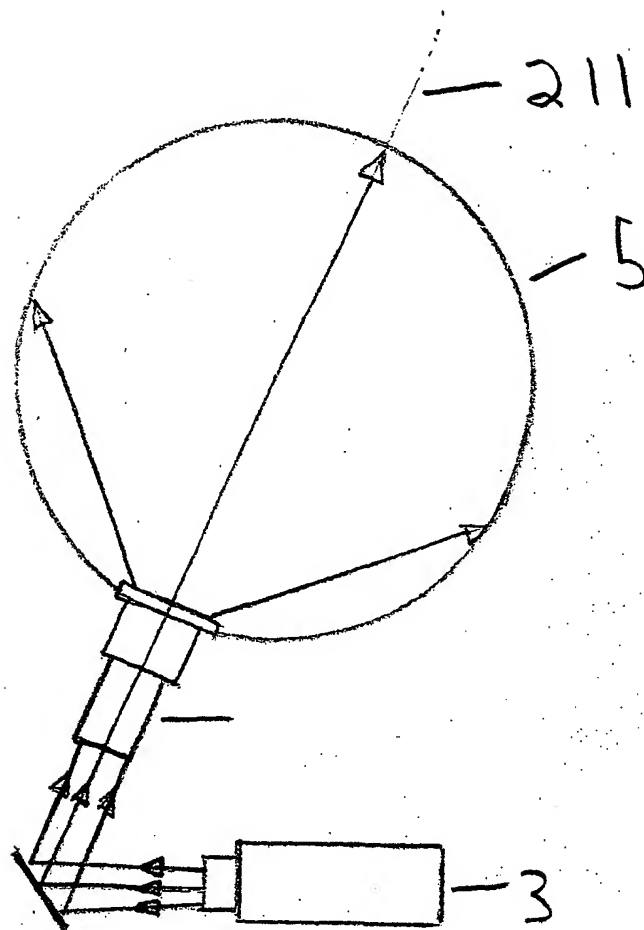


FIG. 12A

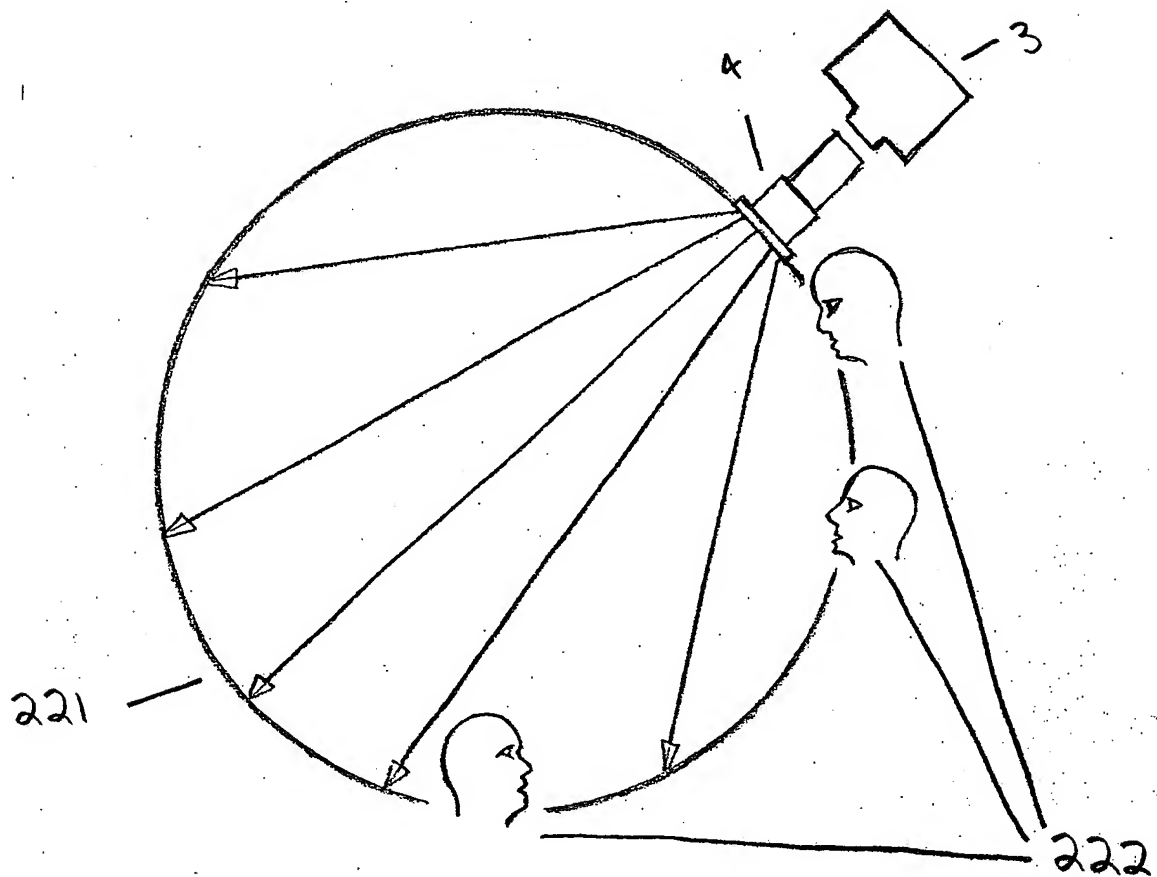


FIG. 12 B

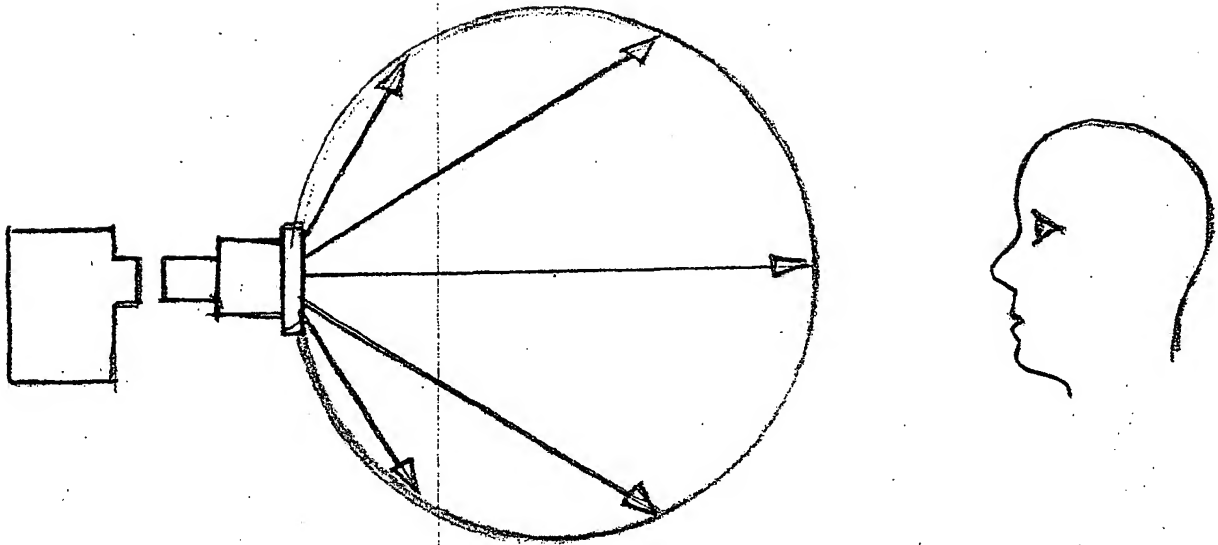


FIG. 12C